

BEST AVAILABLE COPY

Table 1 (continued)
ALPHABETICAL LISTING

Reaction	E°, V	Reaction	E°, V
$\text{PbSO}_4 + 2e \rightleftharpoons \text{Pb(Hg)} + \text{SO}_4^{2-}$	-0.3505	$\text{Se} + 2\text{H}^+ + 2e \rightleftharpoons \text{H}_2\text{Se(aq)}$	-0.399
$\text{Pd}^{2+} + 2e \rightleftharpoons \text{Pd}$	0.951	$\text{H}_2\text{SeO}_3 + 4\text{H}^+ + 4e \rightleftharpoons \text{Se} + 3\text{H}_2\text{O}$	-0.74
$[\text{PdCl}_4]^{2-} + 2e \rightleftharpoons \text{Pd} + 4\text{Cl}^-$	0.591	$\text{SeO}_3^{2-} + 3\text{H}_2\text{O} + 4e \rightleftharpoons \text{Se} + 6\text{OH}^-$	-0.365
$[\text{PdCl}_6]^{4-} + 2e \rightleftharpoons [\text{PdCl}_4]^{2-} + 2\text{Cl}^-$	-1.288	$\text{SeO}_2 + 4\text{H}^+ + 2e \rightleftharpoons \text{H}_2\text{SeO}_3 + \text{H}_2\text{O}$	1.151
$\text{Pd(OH)}_2 + 2e \rightleftharpoons \text{Pd} + 2\text{OH}^-$	0.07	$\text{SeO}_3^{2-} + \text{H}_2\text{O} + 2e \rightleftharpoons \text{SeO}_3^{2-} + 2\text{OH}^-$	0.05
$\text{Pt}^{2+} + 2e \rightleftharpoons \text{Pt}$	-1.118	$\text{SiF}_6^{2-} + 4e \rightleftharpoons \text{Si} + 6\text{F}^-$	-1.24
$[\text{PtCl}_4]^{2-} + 2e \rightleftharpoons \text{Pt} + 4\text{Cl}^-$	0.755	$\text{SiO}_2 \text{ (quartz)} + 4\text{H}^+ + 4e \rightleftharpoons \text{Si} + 2\text{H}_2\text{O}$	-0.857
$[\text{PtCl}_6]^{4-} + 2e \rightleftharpoons [\text{PtCl}_4]^{2-} + 2\text{Cl}^-$	0.68	$\text{SiO}_3^{2-} + 3\text{H}_2\text{O} + 4e \rightleftharpoons \text{Si} + 6\text{OH}^-$	-1.697
$\text{Pt(OH)}_2 + 2e \rightleftharpoons \text{Pt} + 2\text{OH}^-$	0.14	$\text{Sn}^{2+} + 2e \rightleftharpoons \text{Sn}$	-0.1375
$\text{Pu}^{3+} + 3e \rightleftharpoons \text{Pu}$	-2.031	$\text{Sn}^{4+} + 2e \rightleftharpoons \text{Sn}^{2+}$	0.151
$\text{Pu}^{4+} + e \rightleftharpoons \text{Pu}^{3+}$	1.006	$\text{HSnO}_2^- + \text{H}_2\text{O} + 2e \rightleftharpoons \text{Sn} + 3\text{OH}^-$	-0.909
$\text{Pu}^{5+} + e \rightleftharpoons \text{Pu}^{4+}$	1.099	$\text{HSnO}_2^- + \text{H}_2\text{O} + 2e \rightleftharpoons \text{Sn} + 3\text{OH}^-$	-0.93
$\text{PuO}_2(\text{OH})_2 + 2\text{H}^+ + 2e \rightleftharpoons \text{Pu(OH)}_4$	1.325	$\text{Sn(OH)}_6^{2-} + 2e \rightleftharpoons \text{HSnO}_2^- + 3\text{OH}^- + \text{H}_2\text{O}$	-4.10
$\text{PuO}_2(\text{OH})_2 + \text{H}^+ + e \rightleftharpoons \text{PuO}_2\text{OH} + \text{H}_2\text{O}$	-1.062	$\text{Sr}^{2+} + 2e \rightleftharpoons \text{Sr}$	-2.89
$\text{Rb}^+ + e \rightleftharpoons \text{Rb}$	0.300	$\text{Sr}^{2+} + 2e \rightleftharpoons \text{Sr(Hg)}$	-2.88
$\text{Re}^{3+} + 3e \rightleftharpoons \text{Re}$	0.510	$\text{Sr(OH)}_2 + 2e \rightleftharpoons \text{Sr} + 2\text{OH}^-$	-0.750
$\text{ReO}_4^- + 4\text{H}^+ + 3e \rightleftharpoons \text{ReO}_2 + 2\text{H}_2\text{O}$	0.2513	$\text{Ta}_2\text{O}_5 + 10\text{H}^+ + 10e \rightleftharpoons 2\text{Ta} + 5\text{H}_2\text{O}$	0.400
$\text{ReO}_2 + 4\text{H}^+ + 4e \rightleftharpoons \text{Re} + 2\text{H}_2\text{O}$	0.768	$\text{Te}^{2+} + 2e \rightleftharpoons \text{Te}$	0.782
$\text{ReO}_4^- + 2\text{H}^+ + e \rightleftharpoons \text{ReO}_3 + \text{H}_2\text{O}$	-0.584	$\text{TeO}_4^{2-} + 4\text{H}^+ + 3e \rightleftharpoons \text{TeO}_2 + 2\text{H}_2\text{O}$	-1.143
$\text{ReO}_4^- + 4\text{H}_2\text{O} + 7e \rightleftharpoons \text{Re} + 8\text{OH}^-$	0.368	$\text{Te} + 2e \rightleftharpoons \text{Te}^{2-}$	-0.793
$\text{ReO}_4^- + 8\text{H}^+ + 7e \rightleftharpoons \text{Re} + 4\text{H}_2\text{O}$	0.600	$\text{Te} + 2\text{H}^+ + 2e \rightleftharpoons \text{H}_2\text{Te}$	0.568
$\text{Rh}^+ + e \rightleftharpoons \text{Rh}$	0.600	$\text{Te}^{4+} + 4e \rightleftharpoons \text{Te}$	0.593
$\text{Rh}^{2+} + 2e \rightleftharpoons \text{Rh}$	-0.758	$\text{TeO}_2 + 4\text{H}^+ + 4e \rightleftharpoons \text{Te} + 2\text{H}_2\text{O}$	-0.57
$\text{Rh}^{3+} + 3e \rightleftharpoons \text{Rh}$	0.431	$\text{TeO}_3^{2-} + 3\text{H}_2\text{O} + 4e \rightleftharpoons \text{Te} + 6\text{OH}^-$	-0.472
$[\text{RhCl}_6]^{3-} + 3e \rightleftharpoons \text{Rh} + 6\text{Cl}^-$	0.455	$\text{TeO}_4^{2-} + 8\text{H}^+ + 7e \rightleftharpoons \text{Te} + 4\text{H}_2\text{O}$	1.02
$\text{Ru}^{2+} + 2e \rightleftharpoons \text{Ru}$	0.2487	$\text{H}_2\text{TeO}_6 + 2\text{H}^+ + 2e \rightleftharpoons \text{TeO}_2 + 4\text{H}_2\text{O}$	-1.899
$\text{Ru}^{3+} + e \rightleftharpoons \text{Ru}^{2+}$	1.120	$\text{Th}^{4+} + 4e \rightleftharpoons \text{Th}$	-1.789
$\text{RuO}_2 + 4\text{H}^+ + 2e \rightleftharpoons \text{Ru}^{2+} + 2\text{H}_2\text{O}$	0.59	$\text{ThO}_2 + 4\text{H}^+ + 4e \rightleftharpoons \text{Th} + 2\text{H}_2\text{O}$	-2.48
$\text{RuO}_4^- + e \rightleftharpoons \text{RuO}_4^{2-}$	1.00	$\text{Th(OH)}_4 + 4e \rightleftharpoons \text{Th} + 4\text{OH}^-$	-1.630
$\text{RuO}_4 + e \rightleftharpoons \text{RuO}_4^-$	-0.47627	$\text{Ti}^{2+} + 2e \rightleftharpoons \text{Ti}$	-0.368
$\text{S} + 2e \rightleftharpoons \text{S}^{2-}$	0.142	$\text{Ti}^{3+} + 2e \rightleftharpoons \text{Ti}$	-0.502
$\text{S} + 2\text{H}^+ + 2e \rightleftharpoons \text{H}_2\text{S(aq)}$	0.142	$\text{Ti}^{3+} + e \rightleftharpoons \text{Ti}^{2+}$	-0.055
$\text{S} + \text{H}_2\text{O} + 2e \rightleftharpoons \text{HS}^- + \text{OH}^-$	-0.478	$\text{TiO}_2 + 4\text{H}^+ + 2e \rightleftharpoons \text{Ti}^{2+} + 2\text{H}_2\text{O}$	-0.336
$2\text{S} + 2e \rightleftharpoons \text{S}_2^{2-}$	-0.42836	$\text{TiOH}^{3+} + \text{H}^+ + e \rightleftharpoons \text{Ti}^{3+} + \text{H}_2\text{O}$	-0.3338
$\text{S}_2\text{O}_8^{2-} + 4\text{H}^+ + 2e \rightleftharpoons 2\text{H}_2\text{SO}_4$	0.564	$\text{Ti}^+ + e \rightleftharpoons \text{Ti(Hg)}$	1.252
$\text{S}_2\text{O}_8^{2-} + 2e \rightleftharpoons 2\text{SO}_4^{2-}$	2.010	$\text{Ti}^+ + e \rightleftharpoons \text{Ti}$	-0.658
$\text{S}_2\text{O}_8^{2-} + 2\text{H}^+ + 2e \rightleftharpoons 2\text{HSO}_4^-$	2.123	$\text{Ti}^{3+} + 2e \rightleftharpoons \text{Ti}^+$	-0.5568
$\text{S}_2\text{O}_8^{2-} + 2\text{H}^+ + 2e \rightleftharpoons 2\text{H}_2\text{SO}_4$	0.08	$\text{TiBr} + e \rightleftharpoons \text{Ti} + \text{Br}^-$	-0.752
$\text{S}_4\text{O}_8^{2-} + 2e \rightleftharpoons 2\text{S}_2\text{O}_8^{2-}$	-0.056	$\text{TiCl} + e \rightleftharpoons \text{Ti} + \text{Cl}^-$	0.02
$2\text{H}_2\text{SO}_3 + \text{H}^+ + 2e \rightleftharpoons \text{HS}_2\text{O}_4^- + 2\text{H}_2\text{O}$	0.449	$\text{TiI} + e \rightleftharpoons \text{Ti} + \text{I}^-$	-0.34
$\text{H}_2\text{SO}_3 + 4\text{H}^+ + 4e \rightleftharpoons \text{S} + 3\text{H}_2\text{O}$	-1.12	$\text{Ti}_2\text{O}_3 + 3\text{H}_2\text{O} + 4e \rightleftharpoons 2\text{Ti} + 6\text{OH}^-$	-0.05
$2\text{SO}_3^{2-} + 2\text{H}_2\text{O} + 2e \rightleftharpoons \text{S}_2\text{O}_4^{2-} + 4\text{OH}^-$	-0.571	$\text{TiOH} + e \rightleftharpoons \text{Ti} + \text{OH}^-$	-0.4360
$2\text{SO}_3^{2-} + 3\text{H}_2\text{O} + 4e \rightleftharpoons \text{S}_2\text{O}_3^{2-} + 6\text{OH}^-$	0.172	$\text{Ti(OH)}_3 + 2e \rightleftharpoons \text{TiOH} + 2\text{OH}^-$	-1.798
$\text{SO}_3^{2-} + 4\text{H}^+ + 2e \rightleftharpoons \text{H}_2\text{SO}_3 + \text{H}_2\text{O}$	-0.22	$\text{Ti}_2\text{SO}_4 + 2e \rightleftharpoons \text{Ti} + \text{SO}_4^{2-}$	-0.607
$2\text{SO}_3^{2-} + 4\text{H}^+ + 2e \rightleftharpoons \text{S}_2\text{O}_8^{2-} + \text{H}_2\text{O}$	-0.93	$\text{U}^{3+} + 3e \rightleftharpoons \text{U}$	0.612
$\text{SO}_3^{2-} + \text{H}_2\text{O} + 2e \rightleftharpoons \text{SO}_3^{2-} + 2\text{OH}^-$	-0.510	$\text{U}^{4+} + e \rightleftharpoons \text{U}^{3+}$	0.062
$\text{Sb} + 3\text{H}^+ + 3e \rightleftharpoons \text{SbH}_3$	0.152	$\text{UO}_2^{2+} + 4\text{H}^+ + e \rightleftharpoons \text{U}^{4+} + 2\text{H}_2\text{O}$	0.327
$\text{Sb}_2\text{O}_3 + 6\text{H}^+ + 6e \rightleftharpoons 2\text{Sb} + 3\text{H}_2\text{O}$	0.671	$\text{UO}_3^{2+} + e \rightleftharpoons \text{UO}^{2+}$	-1.444
$\text{Sb}_2\text{O}_3 \text{ (senarmonite)} + 4\text{H}^+ + 4e \rightleftharpoons \text{Sb}_2\text{O}_3 + 2\text{H}_2\text{O}$	0.649	$\text{UO}_3^{2+} + 4\text{H}^+ + 2e \rightleftharpoons \text{U}^{4+} + 2\text{H}_2\text{O}$	-1.175
$\text{Sb}_2\text{O}_3 \text{ (valentinite)} + 4\text{H}^+ + 4e \rightleftharpoons \text{Sb}_2\text{O}_3 + 2\text{H}_2\text{O}$	0.581	$\text{UO}_3^{2+} + 4\text{H}^+ + 6e \rightleftharpoons \text{U} + 2\text{H}_2\text{O}$	-0.255
$\text{Sb}_2\text{O}_3 + 6\text{H}^+ + 4e \rightleftharpoons 2\text{SbO}^+ + 3\text{H}_2\text{O}$	0.212	$\text{V}^{2+} + 2e \rightleftharpoons \text{V}$	0.337
$\text{SbO}^+ + 2\text{H}^+ + 3e \rightleftharpoons \text{Sb} + 2\text{H}_2\text{O}$	-0.66	$\text{V}^{3+} + e \rightleftharpoons \text{V}^{2+}$	0.991
$\text{SbO}_2^- + 2\text{H}_2\text{O} + 3e \rightleftharpoons \text{Sb} + 4\text{OH}^-$	-0.59	$\text{VO}^{2+} + 2\text{H}^+ + e \rightleftharpoons \text{V}^{3+} + \text{H}_2\text{O}$	1.00
$\text{SbO}_2^- + 2\text{H}_2\text{O} + 3e \rightleftharpoons \text{SbO}_2^- + 2\text{OH}^-$	-2.077	$\text{VO}_2^+ + 2\text{H}^+ + e \rightleftharpoons \text{VO}^{2+} + \text{H}_2\text{O}$	-0.254
		$\text{V(OH)}_4^+ + 2\text{H}^+ + e \rightleftharpoons \text{VO}^{2+} + 3\text{H}_2\text{O}$	-0.031
		$\text{V(OH)}_4^+ + 4\text{H}^+ + 5e \rightleftharpoons \text{V} + 4\text{H}_2\text{O}$	
		$\text{w.O.} + 2\text{H}^+ + 2e \rightleftharpoons 2\text{WO}_2 + \text{H}_2\text{O}$	

$\text{WO}_2 + 4\text{H}^+ + 4e \rightleftharpoons \text{W}$	
$\text{WO}_3 + 6\text{H}^+ + 6e \rightleftharpoons \text{W}$	
$2\text{WO}_3 + 2\text{H}^+ + 2e \rightleftharpoons \text{W}$	
$\text{Y}^{3+} + 3e \rightleftharpoons \text{Y}$	
$\text{Zn}^{2+} + 2e \rightleftharpoons \text{Zn}$	
$\text{Zn}^{2+} + 2e \rightleftharpoons \text{Zn(Hg)}$	

REDUCTION

$2\text{H}^+ + 2e \rightleftharpoons \text{H}_2$	
$\text{Cu}_2^{2+} + e \rightleftharpoons \text{Cu} + \text{Cu}^+$	
$\text{Ge}^{4+} + 2e \rightleftharpoons \text{Ge}^{2+}$	
$\text{NO}_3^- + \text{H}_2\text{O} + 2e \rightleftharpoons \text{NO}_2^- + \text{OH}^-$	
$\text{Ti}_2\text{O}_3 + 3\text{H}_2\text{O} + 6e \rightleftharpoons 2\text{Ti} + 6\text{OH}^-$	
$\text{SeO}_4^{2-} + \text{H}_2\text{O} + 2e \rightleftharpoons \text{SeO}_3^{2-} + 2\text{OH}^-$	
$\text{UO}_2^{2+} + e \rightleftharpoons \text{UO}_2^+$	
$\text{Pd(OH)}_2 + 2e \rightleftharpoons \text{Pd} + 2\text{OH}^-$	
$\text{AgBr} + e \rightleftharpoons \text{Ag} + \text{Br}^-$	
$\text{S}_2\text{O}_8^{2-} + 2e \rightleftharpoons 2\text{SO}_4^{2-}$	
$\text{AgSCN} + e \rightleftharpoons \text{Ag} + \text{SCN}^-$	
$\text{N}_2 + 2\text{H}_2\text{O} + 6e \rightleftharpoons 2\text{NH}_3 + 2\text{OH}^-$	
$\text{HgO} + \text{H}_2\text{O} + 2e \rightleftharpoons \text{Hg} + 2\text{OH}^-$	
$\text{Ir}_2\text{O}_3 + 3\text{H}_2\text{O} + 6e \rightleftharpoons 2\text{Ir} + 6\text{OH}^-$	
$2\text{NO} + 2e \rightleftharpoons \text{N}_2 + 2\text{OH}^-$	
$[\text{Co(NH}_3)_6]^{3+} + e \rightleftharpoons [\text{Co(NH}_3)_6]^{2+}$	
$\text{H}_2\text{O} + \text{H}_2\text{O} + 2e \rightleftharpoons \text{H}_2 + 2\text{OH}^-$	
$\text{Ge}^{4+} + 4e \rightleftharpoons \text{Ge}$	
$\text{Hg}_2\text{Br}_2 + 2e \rightleftharpoons 2\text{Hg} + 2\text{Br}^-$	
$\text{Pt(OH)}_2 + 2e \rightleftharpoons \text{Pt} + 2\text{OH}^-$	
$\text{S} + 2\text{H}^+ + 2e \rightleftharpoons \text{H}_2$	
$\text{Np}^{4+} + e \rightleftharpoons \text{Np}^{3+}$	
$\text{Ag}_4[\text{Fe(CN)}_6] + e \rightleftharpoons \text{Ag}_3[\text{Fe(CN)}_6] + \text{Ag}^+$	
$\text{IO}_3^- + 2\text{H}_2\text{O} + 2e \rightleftharpoons \text{IO}_2^- + 4\text{OH}^-$	
$\text{Mn(OH)}_3 + e \rightleftharpoons \text{Mn(OH)}_2 + \text{OH}^-$	
$2\text{NO}_2^- + 3\text{H}_2\text{O} + 2e \rightleftharpoons \text{N}_2 + 4\text{OH}^-$	
$\text{Sn}^{4+} + 2e \rightleftharpoons \text{Sn}^{2+}$	
$\text{Sb}_2\text{O}_3 + 6\text{H}^+ + 6e \rightleftharpoons 2\text{Sb} + 3\text{H}_2\text{O}$	
$\text{Cu}^{2+} + e \rightleftharpoons \text{Cu}^+$	
$\text{BiOCl} + 2\text{H}^+ + 2e \rightleftharpoons \text{Bi} + \text{H}_2\text{O} + \text{Cl}^-$	
$\text{Bi(ClO}_4)_3 + 3e \rightleftharpoons \text{Bi} + 3\text{ClO}_4^-$	
$\text{Co(OH)}_3 + e \rightleftharpoons \text{Co(OH)}_2 + \text{OH}^-$	
$\text{SO}_4^{2-} + 4\text{H}^+ + 2e \rightleftharpoons \text{S} + 2\text{H}_2\text{O}$	
$\text{SbO}^+ + 2\text{H}^+ + 2e \rightleftharpoons \text{Sb} + 2\text{H}_2\text{O}$	
$\text{AgCl} + e \rightleftharpoons \text{Ag} + \text{Cl}^-$	
$\text{As}_2\text{O}_3 + 6\text{H}^+ + 6e \rightleftharpoons 2\text{As} + 3\text{H}_2\text{O}$	
Calomel electr.	
$\text{Ge}^{2+} + 2e \rightleftharpoons \text{Ge}$	
Calomel electr.	
$\text{PbO}_2 + \text{H}_2\text{O} + 2e \rightleftharpoons \text{Pb} + 2\text{OH}^-$	
$\text{HASO}_2 + 3\text{H}^+ + 2e \rightleftharpoons \text{As} + 2\text{H}_2\text{O}$	
$\text{Ru}^{3+} + e \rightleftharpoons \text{Ru}^{2+}$	
$\text{ReO}_2 + 4\text{H}^+ + 4e \rightleftharpoons \text{Re} + 2\text{H}_2\text{O}$	
$\text{IO}_3^- + 3\text{H}_2\text{C} \rightleftharpoons \text{I}^- + 3\text{H}_2\text{O} + 6\text{H}^+$	
$\text{Hg}_2\text{Cl}_2 + 2e \rightleftharpoons 2\text{Hg} + 2\text{Cl}^-$	
Calomel elec	
Calomel ele	

7-D-153

BEST AVAILABLE COPY

Table 1 (continued)
ALPHABETICAL LISTING

Reaction	E°, V	Reaction	E°, V	Reaction	E°, V
p-benzoquinone + 2 H ⁺ + 2 e ⁻ ⇌ hydroquinone	0.6992	Co ³⁺ + e ⁻ ⇌ Co ²⁺ (2 mol/l H ₂ SO ₄)	1.8	Hg ₂ (ac) ₂ + 2 e ⁻ ⇌ 2 Hg	0.10
BiCl ₃ + 3 e ⁻ ⇌ Bi + 4 Cl ⁻	0.16	[Co(NH ₃) ₆] ³⁺ + e ⁻ ⇌ [Co(NH ₃) ₆] ²⁺	0.108	HgBr ₂ + 2 e ⁻ ⇌ 2 Hg	0.1
-Bi ₂ O ₃ + 3 H ₂ O + 6 e ⁻ ⇌ 2 Bi + 6 OH ⁻	-0.46	Co(OH) ₃ + 2 e ⁻ ⇌ Co + 2 OH ⁻	0.16	HgCl ₂ + 2 e ⁻ ⇌ 2 Hg	0.1
-Bi ₂ O ₃ + 4 H ⁺ + 2 e ⁻ ⇌ 2 BiO ⁺ + 2 H ₂ O	-1.593	Co(OH) ₃ + e ⁻ ⇌ Co(OH) ₂ + OH ⁻	0.16	Hg ₂ HPO ₄ + 2 e ⁻ ⇌ 2 Hg	0.1
-BiO ⁺ + 2 H ⁺ + 3 e ⁻ ⇌ Bi + H ₂ O	0.320	CO ₂ + 2 H ⁺ + 2 e ⁻ ⇌ HCOOH	0.19	HgI ₂ + 2 e ⁻ ⇌ 2 Hg	0.1
-BiOCl + 2 H ⁺ + 3 e ⁻ ⇌ Bi + Cl ⁻ + H ₂ O	0.1583	Cr ³⁺ + 2 e ⁻ ⇌ Cr	0.01	Hg ₂ O + H ₂ O + 2 e ⁻ ⇌ 2 Hg	0.1
-Br ₂ (aq) + 2 e ⁻ ⇌ 2 Br ⁻	1.0873	Cr ³⁺ + e ⁻ ⇌ Cr ²⁺	-0.40	HgO + H ₂ O + 2 e ⁻ ⇌ 2 Hg	0.1
Br ₂ (l) + 2 e ⁻ ⇌ 2 Br ⁻	1.066	Cr ³⁺ + 3 e ⁻ ⇌ Cr	-0.74	Hg ₂ SO ₄ + 2 e ⁻ ⇌ 2 Hg	0.1
HBrO + H ⁺ + 2 e ⁻ ⇌ Br ⁻ + H ₂ O	1.331	Cr ₂ O ₇ ²⁻ + 14 H ⁺ + 6 e ⁻ ⇌ 2 Cr ³⁺ + 7 H ₂ O	1.23	I ₂ + 2 e ⁻ ⇌ 2 I ⁻	0.54
HBrO + H ⁺ + e ⁻ ⇌ 1/2 Br ₂ (aq) + H ₂ O	1.574	CrO ₂ + 2 H ₂ O + 3 e ⁻ ⇌ Cr + 4 OH ⁻	-1.2	I ₂ S ₂ + 2 e ⁻ ⇌ 3 I ⁻	0.54
HBrO ₂ + H ⁺ + e ⁻ ⇌ 1/2 Br ₂ (l) + H ₂ O	1.596	HCrO ₄ ²⁻ + 7 H ⁺ + 3 e ⁻ ⇌ Cr ³⁺ + 4 H ₂ O	-1.35	IO ₃ ⁻ + 2 e ⁻ ⇌ IO ₂ ⁻	0.15
BrO ⁻ + H ₂ O + 2 e ⁻ ⇌ Br ⁻ + 2 OH ⁻	0.761	CrO ₄ ²⁻ + 4 H ₂ O + 3 e ⁻ ⇌ Cr(OH) ₃ + 5 OH ⁻	-0.13	(H ₂ IO ₆ + H ⁺ + 2 e ⁻ ⇌ 2 HIO + 2 H ⁺ + 2 OH ⁻)	0.15
BrO ₃ ⁻ + 6 H ⁺ + 5 e ⁻ ⇌ 1/2 Br ₂ + 3 H ₂ O	1.482	Cr(OH) ₃ + 3 e ⁻ ⇌ Cr + 3 OH ⁻	-1.4	2 HIO + H ⁺ + 2 e ⁻ ⇌ I ₂	0.15
BrO ₃ ⁻ + 6 H ⁺ + 6 e ⁻ ⇌ Br ⁻ + 3 H ₂ O	1.423	Cs ⁺ + e ⁻ ⇌ Cs	-2.92	IO ₃ ⁻ + H ₂ O + 2 e ⁻ ⇌ IO ₂ ⁻	0.15
BrO ₃ ⁻ + 3 H ₂ O + 6 e ⁻ ⇌ Br ⁻ + 6 OH ⁻	0.61	Cu ⁺ + e ⁻ ⇌ Cu	0.52	2 IO ₃ ⁻ + 12 H ⁺ + 10 e ⁻ ⇌ I ₂	0.15
Ca ⁺ + e ⁻ ⇌ Ca	-3.80	Cu ²⁺ + e ⁻ ⇌ Cu ⁺	0.15	IO ₃ ⁻ + 6 H ⁺ + 6 e ⁻ ⇌ I ₂	0.15
Ca ²⁺ + 2 e ⁻ ⇌ Ca	-2.868	Cu ²⁺ + 2 e ⁻ ⇌ Cu	0.345	IO ₃ ⁻ + 2 H ₂ O + 4 e ⁻ ⇌ I ₂	0.15
Calomel electrode, 1 molal KCl	0.2800	Cu ²⁺ + 2 CN ⁻ + e ⁻ ⇌ [Cu(CN) ₂] ⁻	-1.103	IO ₃ ⁻ + 3 H ₂ O + 6 e ⁻ ⇌ I ₂	0.15
Calomel electrode, 1 mol/l KCl (NCE)	0.2801	CuI ₂ + e ⁻ ⇌ Cu + 2 I ⁻	0.00	In ⁺ + e ⁻ ⇌ In	0.15
Calomel electrode, 0.1 mol/l KCl	0.3337	Cu ₂ O + H ₂ O + 2 e ⁻ ⇌ 2 Cu + 2 OH ⁻	-0.360	In ²⁺ + e ⁻ ⇌ In ⁺	0.15
Calomel electrode, saturated KCl (SCE)	0.2412	Cu(OH) ₂ + 2 e ⁻ ⇌ Cu + 2 OH ⁻	-0.222	In ³⁺ + e ⁻ ⇌ In ²⁺	0.15
Calomel electrode, saturated NaCl (SSCE)	0.2360	2 Cu(OH) ₂ + 2 e ⁻ ⇌ Cu ₂ O + 2 OH ⁻ + H ₂ O	-0.080	In ³⁺ + 2 e ⁻ ⇌ In ⁺	0.15
Ca(OH) ₂ + 2 e ⁻ ⇌ Ca + 2 OH ⁻	-3.02	D ⁺ + e ⁻ ⇌ 1/2 D ₂	-0.003	In ³⁺ + 3 e ⁻ ⇌ In	0.15
Cd ²⁺ + 2 e ⁻ ⇌ Cd	-0.4030	2 D ⁺ + 2 e ⁻ ⇌ D ₂	-0.04	Ir ³⁺ + 3 e ⁻ ⇌ Ir	0.15
Cd ²⁺ + 2 e ⁻ ⇌ Cd(Hg)	-0.3521	Eu ²⁺ + 2 e ⁻ ⇌ Eu	-3.395	[IrCl ₄] ⁻ + e ⁻ ⇌ [IrCl ₄] ²⁻	0.15
Cd(OH) ₂ + 2 e ⁻ ⇌ Cd(Hg) + 2 OH ⁻	-0.809	Eu ³⁺ + 3 e ⁻ ⇌ Eu	-2.407	[IrCl ₄] ²⁻ + 3 e ⁻ ⇌ Ir	0.15
CdSO ₄ + 2 e ⁻ ⇌ Cd + SO ₄ ²⁻	-0.246	Eu ³⁺ + e ⁻ ⇌ Eu ²⁺	-0.36	Ir ₂ O ₃ + 3 H ₂ O + 6 e ⁻ ⇌ 2 Ir	0.15
Ce ³⁺ + 3 e ⁻ ⇌ Ce	-2.483	F ₂ + 2 H ⁺ + 2 e ⁻ ⇌ 2 HF	3.053	K ⁺ + e ⁻ ⇌ K	0.15
Ce ³⁺ + 3 e ⁻ ⇌ Ce(Hg)	-1.4373	F ₂ + 2 e ⁻ ⇌ 2 F ⁻	2.866	La ³⁺ + 3 e ⁻ ⇌ La	0.15
Ce ⁴⁺ + e ⁻ ⇌ Ce ³⁺	1.61	F ₂ O + 2 H ⁺ + 4 e ⁻ ⇌ H ₂ O + 2 F ⁻	-2.153	La(OH) ₃ + 3 e ⁻ ⇌ La	0.15
CeOH ³⁺ + H ⁺ + e ⁻ ⇌ Ce ³⁺ + H ₂ O	1.715	Fe ²⁺ + 2 e ⁻ ⇌ Fe	-0.447	Li ⁺ + e ⁻ ⇌ Li	0.15
Cl ₂ (g) + 2 e ⁻ ⇌ Cl ⁻	1.35827	Fe ³⁺ + 3 e ⁻ ⇌ Fe	-0.037	Mg ⁺ + e ⁻ ⇌ Mg	0.15
HClO + H ⁺ + e ⁻ ⇌ 1/2 Cl ₂ + H ₂ O	1.611	Fe ³⁺ + e ⁻ ⇌ Fe ²⁺	0.771	Mg ²⁺ + 2 e ⁻ ⇌ Mg	0.15
HClO + H ⁺ + 2 e ⁻ ⇌ Cl ⁻ + H ₂ O	1.482	[Fe(CN) ₆] ³⁻ + e ⁻ ⇌ [Fe(CN) ₆] ⁴⁻	0.358	Mg(OH) ₂ + 2 e ⁻ ⇌ Mg	0.15
ClO ⁻ + H ₂ O + 2 e ⁻ ⇌ Cl ⁻ + 2 OH ⁻	0.81	FeO ₄ ²⁻ + 8 H ⁺ + 3 e ⁻ ⇌ Fe ³⁺ + 4 H ₂ O	2.20	Mn ²⁺ + 2 e ⁻ ⇌ Mn	0.15
ClO ₂ + H ⁺ + e ⁻ ⇌ HClO ₂	1.277	Fe(OH) ₃ + e ⁻ ⇌ Fe(OH) ₂ + OH ⁻	-0.56	Mn ³⁺ + 3 e ⁻ ⇌ Mn ²⁺	0.15
HClO ₂ + 2 H ⁺ + 2 e ⁻ ⇌ HClO + H ₂ O	1.645	[Fe(phenanthroline) ₃] ³⁺ + e ⁻ ⇌ [Fe(phenanthroline) ₃] ²⁺	1.147	MnO ₂ + 4 H ⁺ + 2 e ⁻ ⇌ Mn ²⁺	0.15
HClO ₂ + 3 H ⁺ + 3 e ⁻ ⇌ 1/2 Cl ₂ + 2 H ₂ O	1.628	[Fe(phen) ₃] ³⁺ + e ⁻ ⇌ [Fe(phen) ₃] ²⁺ (1 mol/l H ₂ SO ₄)	1.06	MnO ₄ ⁻ + e ⁻ ⇌ MnO ₄ ²⁻	0.15
HClO ₂ + 3 H ⁺ + 4 e ⁻ ⇌ Cl ⁻ + 2 H ₂ O	1.570	[Ferricinium] ⁺ + e ⁻ ⇌ ferrocene	0.400	MnO ₄ ⁻ + 4 H ⁺ + 2 e ⁻ ⇌ MnO ₂ + 2 H ₂ O	0.15
ClO ₂ ⁻ + H ₂ O + 2 e ⁻ ⇌ ClO ⁻ + 2 OH ⁻	0.66	Ga ³⁺ + 3 e ⁻ ⇌ Ga	-0.560	Mn(OH) ₂ + 2 e ⁻ ⇌ Mn	0.15
ClO ₂ ⁻ + 2 H ₂ O + 4 e ⁻ ⇌ Cl ⁻ + 4 OH ⁻	0.76	H ₂ GaO ₃ ⁻ + H ₂ O + 3 e ⁻ ⇌ Ga + 4 OH ⁻	-1.219	Mn(OH) ₃ + e ⁻ ⇌ Mn	0.15
ClO ₂ (aq) + e ⁻ ⇌ ClO ₂ ⁻	0.954	Ge ²⁺ + 2 e ⁻ ⇌ Ge	0.24	Mo ³⁺ + 3 e ⁻ ⇌ Mo	0.15
ClO ₃ ⁻ + 2 H ⁺ + e ⁻ ⇌ ClO ₂ + H ₂ O	1.152	Ge ⁴⁺ + 4 e ⁻ ⇌ Ge	0.124	N ₂ + 2 H ₂ O + 6 e ⁻ ⇌ 2 NH ₃ + 2 OH ⁻	0.15
ClO ₃ ⁻ + 3 H ⁺ + 2 e ⁻ ⇌ HClO ₂ + H ₂ O	1.214	Ge ⁴⁺ + 2 e ⁻ ⇌ Ge ²⁺	0.00	3 N ₂ + 2 H ⁺ + 2 e ⁻ ⇌ 2 N ₂	0.15
ClO ₃ ⁻ + 6 H ⁺ + 5 e ⁻ ⇌ 1/2 Cl ₂ + 3 H ₂ O	1.47	GeO ₂ + 2 H ⁺ + 2 e ⁻ ⇌ GeO + H ₂ O	-0.118	N ₂ O + 2 H ⁺ + 2 e ⁻ ⇌ N ₂	0.15
ClO ₃ ⁻ + 6 H ⁺ + 6 e ⁻ ⇌ Cl ⁻ + 3 H ₂ O	1.451	H ₂ GeO ₃ + 4 H ⁺ + 4 e ⁻ ⇌ Ge + 3 H ₂ O	-0.182	N ₂ O ₄ + 2 e ⁻ ⇌ 2 NO ₂	0.15
ClO ₃ ⁻ + H ₂ O + 2 e ⁻ ⇌ ClO ₂ ⁻ + 2 OH ⁻	0.33	2 H ⁺ + 2 e ⁻ ⇌ H ₂	0.00000	N ₂ O ₄ + 2 H ⁺ + 2 e ⁻ ⇌ 2 NO ₂	0.15
ClO ₃ ⁻ + 3 H ₂ O + 6 e ⁻ ⇌ Cl ⁻ + 6 OH ⁻	0.62	H ₂ + 2 e ⁻ ⇌ 2 H ⁻	-2.23	N ₂ O ₄ + 4 H ⁺ + 2 e ⁻ ⇌ 2 NO ₂	0.15
ClO ₄ ⁻ + 2 H ⁺ + 2 e ⁻ ⇌ ClO ₃ ⁻ + H ₂ O	1.189	HO ₂ + H ⁺ + e ⁻ ⇌ H ₂ O ₂	1.495	N ₂ O ₄ + 4 H ⁺ + 2 e ⁻ ⇌ 2 NO ₂	0.15
ClO ₄ ⁻ + 8 H ⁺ + 7 e ⁻ ⇌ 1/2 Cl ₂ + 4 H ₂ O	1.39	2 H ₂ O + 2 e ⁻ ⇌ H ₂ + 2 OH ⁻	-0.8277	N ₂ O ₄ + 4 H ⁺ + 2 e ⁻ ⇌ 2 NO ₂	0.15
ClO ₄ ⁻ + 8 H ⁺ + 8 e ⁻ ⇌ Cl ⁻ + 4 H ₂ O	1.389	H ₂ O ₂ + 2 H ⁺ + 2 e ⁻ ⇌ 2 H ₂ O	1.776	N ₂ O ₄ + 4 H ⁺ + 2 e ⁻ ⇌ 2 NO ₂	0.15
ClO ₄ ⁻ + H ₂ O + 2 e ⁻ ⇌ ClO ₃ ⁻ + 2 OH ⁻	0.36	HfO ₂ ²⁺ + 2 H ⁺ + 4 e ⁻ ⇌ Hf + H ₂ O	-1.724	N ₂ O ₄ + 4 H ⁺ + 2 e ⁻ ⇌ 2 NO ₂	0.15
(CN) ₂ + 2 H ⁺ + 2 e ⁻ ⇌ 2 HCN	0.373	HfO ₂ + 4 H ⁺ + 4 e ⁻ ⇌ Hf + 2 H ₂ O	-1.505	N ₂ O ₄ + 4 H ⁺ + 2 e ⁻ ⇌ 2 NO ₂	0.15
2 HCNO + 2 H ⁺ + 2 e ⁻ ⇌ (CN) ₂ + 2 H ₂ O	0.330	HfO(OH) ₂ + H ₂ O + 4 e ⁻ ⇌ Hf + 4 OH ⁻	-2.501	2 NH ₃ + 2 e ⁻ ⇌ 2 NH ₂ ⁻	0.15
(CNS) ₂ + 2 e ⁻ ⇌ 2 CNS ⁻	0.77	Hg ²⁺ + 2 e ⁻ ⇌ Hg	0.851	2 NO + 2 e ⁻ ⇌ 2 N	0.15
Co ³⁺ + 2 e ⁻ ⇌ Co	-0.28	2 Hg ²⁺ + 2 e ⁻ ⇌ Hg ₂ ²⁺	0.920	2 NO + 2 H ⁺ + 2 e ⁻ ⇌ 2 NO	0.15
		Hg ₂ ²⁺ + 2 e ⁻ ⇌ 2 Hg	0.7973	2 NO + H ₂ O + 2 e ⁻ ⇌ 2 NO	0.15

A = Weight per cent of solute
B = Molecular weight of solvent
E = Molecular weight of solute
F = Grams of solute per liter of solution

G = Molality
M = Molarity
N = Mole fraction
R = Density of solution grams per cc

Concentration of solute— SOUGHT	Concentration of solute—GIVEN				
	A	N	G	M	F
A	—	$\frac{100N \times E}{N \times E + (1 - N)B}$	$\frac{100G \times E}{1000 + G \times E}$	$\frac{M \times E}{10R}$	$\frac{F}{10R}$
N	$\frac{A}{E} + \frac{100 - A}{B}$	—	$\frac{B \times G}{B \times G + 1000}$	$\frac{B \times M}{M(B - E) + 1000R}$	$\frac{B \times F}{F(B - E) + 1000R \times E}$
G	$\frac{1000A}{E(100 - A)}$	$\frac{1000N}{B - N \times B}$	—	$\frac{1000M}{1000R - (M \times E)}$	$\frac{1000F}{E(1000R - F)}$
M	$\frac{10R \times A}{E}$	$\frac{1000R \times N}{N \times E + (1 - N)B}$	$\frac{1000R \times G}{1000 + E \times G}$	—	$\frac{F}{E}$
F	10AR	$\frac{1000R \times N \times E}{N \times E + (1 - N)B}$	$\frac{1000R \times G \times E}{1000 + G \times E}$	M × E	—

ELECTROCHEMICAL SERIES

Petr Vanýsek

There are three tables for this Electrochemical Series. Each table lists standard reduction potentials, E° values, at 298.15 K (25°C), and at a pressure of 101.325 kPa (1 atm.). Table 1 is an alphabetical listing of the elements according to the symbols for the elements. Thus, data for Silver (Ag) precedes those for Aluminum (Al). Table 2 lists only those reduction reactions which have E° values positive to the potential of the Standard Hydrogen Electrode. In Table 2, the reactions are listed in the order of increasing positive potential and range from 0.000 V to +3.053 V. Table 3 lists only those reduction reactions which have E° values negative to the potential of the Standard Hydrogen Electrode. In Table 3, reactions are listed in the order of increasing negative potential and range from -0.017 to -4.10 V.

Table 1
ALPHABETICAL LISTING

Reaction	E° , V	Reaction	E° , V
$\text{Ag}^+ + e \rightleftharpoons \text{Ag}$	0.7996	$\text{Ag}_2\text{WO}_4 + 2e \rightleftharpoons 2\text{Ag} + \text{WO}_4^{2-}$	0.4660
$\text{Ag}^{2+} + e \rightleftharpoons \text{Ag}^+$	1.980	$\text{Al}^{3+} + 3e \rightleftharpoons \text{Al}$	-1.662
$\text{Ag}(\text{ac}) + e \rightleftharpoons \text{Ag} + (\text{ac})^-$	0.643	$\text{H}_2\text{AlO}_3^- + \text{H}_2\text{O} + 3e \rightleftharpoons \text{Al} + 4\text{OH}^-$	-2.33
$\text{AgBr} + e \rightleftharpoons \text{Ag} + \text{Br}^-$	0.07133	$\text{AlF}_6^{3-} + 3e \rightleftharpoons \text{Al} + 6\text{F}^-$	-2.069
$\text{AgBrO}_3 + e \rightleftharpoons \text{Ag} + \text{BrO}_3^-$	0.546	$\text{As} + 3\text{H}^+ + 3e \rightleftharpoons \text{AsH}_3$	-0.608
$\text{Ag}_2\text{C}_2\text{O}_4 + 2e \rightleftharpoons 2\text{Ag} + \text{C}_2\text{O}_4^{2-}$	0.4647	$\text{As}_2\text{O}_3 + 6\text{H}^+ + 6e \rightleftharpoons 2\text{As} + 3\text{H}_2\text{O}$	0.234
$\text{AgCl} + e \rightleftharpoons \text{Ag} + \text{Cl}^-$	0.22233	$\text{HAsO}_2 + 3\text{H}^+ + 3e \rightleftharpoons \text{As} + 2\text{H}_2\text{O}$	0.248
$\text{AgCN} + e \rightleftharpoons \text{Ag} + \text{CN}^-$	-0.017	$\text{AsO}_2^- + 2\text{H}_2\text{O} + 3e \rightleftharpoons \text{As} + 4\text{OH}^-$	-0.68
$\text{Ag}_2\text{CO}_3 + 2e \rightleftharpoons 2\text{Ag} + \text{CO}_3^{2-}$	0.47	$\text{H}_3\text{AsO}_4 + 2\text{H}^+ + 2e \rightleftharpoons \text{HAsO}_2 + 2\text{H}_2\text{O}$	0.560
$\text{Ag}_2\text{CrO}_4 + 2e \rightleftharpoons 2\text{Ag} + \text{CrO}_4^{2-}$	0.4470	$\text{AsO}_4^{3-} + 2\text{H}_2\text{O} + 2e \rightleftharpoons \text{AsO}_2^- + 4\text{OH}^-$	-0.71
$\text{AgF} + e \rightleftharpoons \text{Ag} + \text{F}^-$	0.779	$\text{Au}^+ + e \rightleftharpoons \text{Au}$	1.692
$\text{Ag}[\text{Fe}(\text{CN})_6] + 4e \rightleftharpoons 4\text{Ag} + [\text{Fe}(\text{CN})_6]^{4-}$	0.1478	$\text{Au}^{3+} + 2e \rightleftharpoons \text{Au}^+$	1.401
$\text{AgI} + e \rightleftharpoons \text{Ag} + \text{I}^-$	-0.15224	$\text{Au}^{3+} + 3e \rightleftharpoons \text{Au}$	1.498
$\text{AgIO}_3 + e \rightleftharpoons \text{Ag} + \text{IO}_3^-$	0.354	$\text{AuBr}_2^+ + e \rightleftharpoons \text{Au} + 2\text{Br}^-$	0.959
$\text{Ag}_2\text{MoO}_4 + 2e \rightleftharpoons 2\text{Ag} + \text{MoO}_4^{2-}$	0.4573	$\text{AuBr}_4^- + 3e \rightleftharpoons \text{Au} + 4\text{Br}^-$	0.854
$\text{AgNO}_3 + e \rightleftharpoons \text{Ag} + \text{NO}_3^-$	0.564	$\text{AuCl}_4^- + 3e \rightleftharpoons \text{Au} + 4\text{Cl}^-$	1.002
$\text{Ag}_2\text{O} + \text{H}_2\text{O} + 2e \rightleftharpoons 2\text{Ag} + 2\text{OH}^-$	0.342	$\text{Au}(\text{OH})_3 + 3\text{H}^+ + 3e \rightleftharpoons \text{Au} + 3\text{H}_2\text{O}$	1.45
$\text{Ag}_2\text{O}_2 + \text{H}_2\text{O} + 2e \rightleftharpoons 2\text{AgO} + 2\text{OH}^-$	0.739	$\text{H}_2\text{BO}_3^- + 5\text{H}_2\text{O} + 8e \rightleftharpoons \text{BH}_4^- + 8\text{OH}^-$	-1.24
$2\text{Ag}_2\text{O} + \text{H}_2\text{O} + 2e \rightleftharpoons \text{Ag}_2\text{O} + 2\text{OH}^-$	0.607	$\text{H}_2\text{BO}_3^- + \text{H}_2\text{O} + 3e \rightleftharpoons \text{B} + 4\text{OH}^-$	-1.79
$\text{AgOCN} + e \rightleftharpoons \text{Ag} + \text{OCN}^-$	0.41	$\text{H}_3\text{BO}_3 + 3\text{H}^+ + 3e \rightleftharpoons \text{B} + 3\text{H}_2\text{O}$	-0.8698
$\text{Ag}_2\text{S} + 2e \rightleftharpoons 2\text{Ag} + \text{S}^{2-}$	0.691	$\text{Ba}^{2+} + 2e \rightleftharpoons \text{Ba}$	-2.912
$\text{Ag}_2\text{S} + 2\text{H}^+ + 2e \rightleftharpoons 2\text{Ag} + \text{H}_2\text{S}$	-0.0366	$\text{Ba}^{2+} + 2e \rightleftharpoons \text{Ba}(\text{Hg})$	-1.570
$\text{AgSCN} + e \rightleftharpoons \text{Ag} + \text{SCN}^-$	0.08951	$\text{Ba}(\text{OH})_2 + 2e \rightleftharpoons \text{Ba} + 2\text{OH}^-$	-2.99
$\text{Ag}_2\text{SeO}_4 + 2e \rightleftharpoons 2\text{Ag} + \text{SeO}_4^{2-}$	0.3629	$\text{Be}^{2+} + 2e \rightleftharpoons \text{Be}$	-1.847
$\text{Ag}_2\text{SO}_4 + 2e \rightleftharpoons 2\text{Ag} + \text{SO}_4^{2-}$	0.654	$\text{Be}_2\text{O}_3 + 3\text{H}_2\text{O} + 4e \rightleftharpoons 2\text{Be} + 6\text{OH}^-$	-2.63